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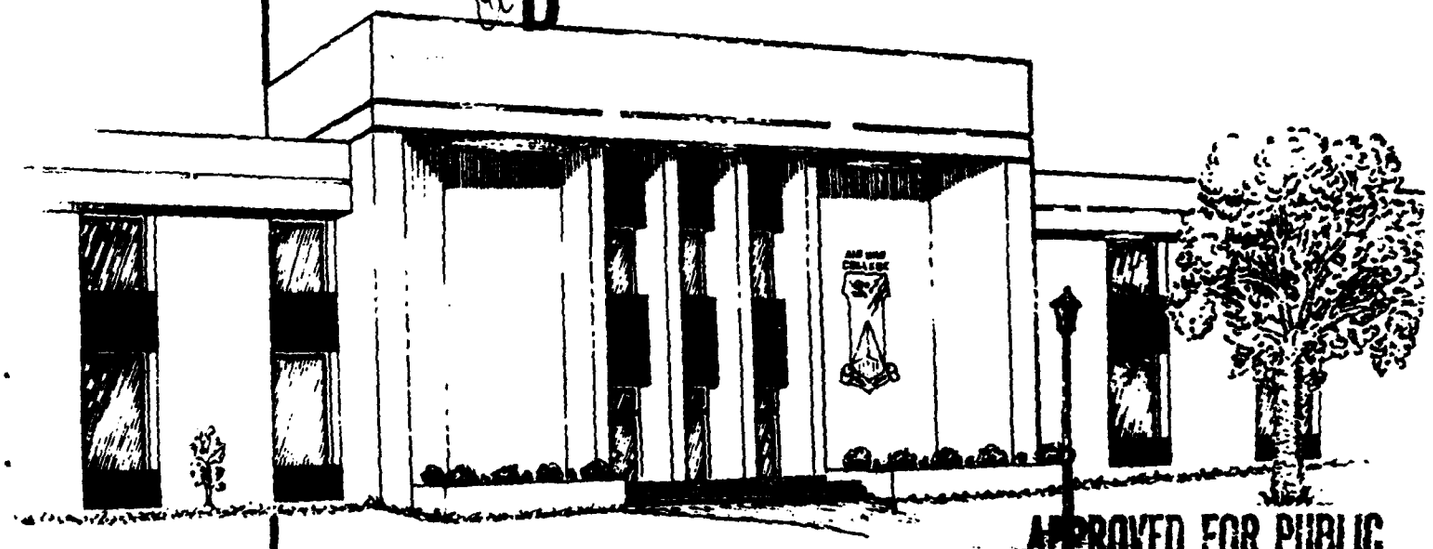
AIR WAR COLLEGE

RESEARCH REPORT

LOGISTICAL SUPPORT FOR DEEP OPERATIONS
IN THE AIRLAND BATTLE

LIEUTENANT COLONEL PHARES E. NOYES, USA
LIEUTENANT COLONEL CHARLES D. POSTA, USA

1989



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UNITED STATES AIR FORCE
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LOGISTICAL SUPPORT FOR DEEP OPERATIONS IN THE AIRLAND BATTLE

by

Phares E. Noyes
Lieutenant Colonel, USA

and

Charles D. Posta
Lieutenant Colonel, USA

A DEFENSE ANALYTICAL STUDY TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Lieutenant Colonel Carlos C. Langston, Jr.

MAXWELL AIR FORCE BASE, ALABAMA

May 1989

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EXECUTIVE SUMMARY

TITLE: LOGISTICAL SUPPORT FOR DEEP OPERATIONS IN THE AIRLAND BATTLE

AUTHORS: Phares E. Noyes, Lieutenant Colonel, USA

Charles D. Posta, Lieutenant Colonel, USA

The deep operations concept of AirLand Battle was examined to determine if the deep operation is sustainable with present combat service support capabilities. Some new sustainment initiatives were reviewed. The authors' research revealed that the Army does presently have the capability to sustain a deep attack limited in depth and duration in the European battlefield environment. However, the Army has not finalized and disseminated a sustainment doctrine.

Of paramount importance is the development and dissemination of a sustainment doctrine for the support of AirLand Battle. Recommendations were also made that the Army continue initiatives to redesign organizational structures, design new operational techniques and procure new equipment to take advantage of new technology; improve support element mobility, capacity and survivability; and design new automated distribution systems to enhance support of Airland Battle.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Phares E. Noyes (B.S., William Carey College) has been interested in both armored warfare and logistics since his entrance into military service in 1966. He has served in Vietnam and Germany at the armor company and battalion level. He commanded the 4th Battalion, 8th Cavalry Regiment, the first US armor battalion to win the coveted Canadian Army Trophy. He is a graduate of the US Army Command and General Staff College. He has earned the Legion of Merit and Bronze Star Medals. Lieutenant Colonel Noyes has been selected for promotion to Colonel. He is a graduate of the Air War College, class of 1989.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Charles D. Posta (M.B.A., Tulane University) is a career Army logistician. He has served in Vietnam as a company commander, Korea as a company commander and logistics staff officer, and in Germany as a company commander and on his last assignment, as Commander of the 181st Transportation Battalion. He has also served in the Pentagon, in the Office of the Comptroller of the Army, and in the Organization of the Joint Chiefs of Staff. He is a graduate of the US Army Command and General Staff College. He has earned the Bronze Star Medal with two oak leaf clusters and the Meritorious Service Medal with five oak leaf clusters. Lieutenant Colonel Posta has been selected for promotion to Colonel. He is a graduate of the Air War College, class of 1989.

CHAPTER I

INTRODUCTION

Successful deep operations are key to overall success on the battlefield.

> While the use of heavy maneuver in the deep operation is both complex and risky, it can, if executed properly, be devastating to the enemy. To place a heavy maneuver force in the enemy's rear area where it can destroy such high-value targets as artillery, reserves, follow-on forces, command and control centers, and logistical facilities can be the stroke that tips the close operation in favor of the corps. (1:3-12 to 3-13)

"Success in supporting the deep attack depends on a well formed ability to generate the means to shape and sustain a workable support structure across the depth of the entire battlefield." (2:13)

We examined the deep operations concept of AirLand Battle to determine if the deep operation is sustainable with present combat service support capabilities and reviewed some new sustainment initiatives. Our research revealed that the Army does presently have the capability to sustain a deep attack limited in depth and duration in the European battlefield environment. However, the Army has not finalized and disseminated a sustainment doctrine to support the AirLand Battle or the deep operation.

Combat service support initiatives to redesign organizational structures, take advantage of new technology and invent new operational techniques will enable better future support of AirLand Battle. Efforts to enhance mobility, capacity and survivability of support elements, and design new automated systems for control of supply distribution will also enhance support of Airland Battle.

However, a sustainment doctrine for the support of AirLand Battle must be finalized, disseminated and understood by Army leadership and personnel to ensure a cohesive effort to enhance sustainment of AirLand Battle including deep operations.

CHAPTER II

AIRLAND BATTLE DOCTRINE

The Army's operational concept is at the apex of its doctrine. General Curtis E. Lemay had several views on doctrine:

> At the very heart of warfare lies doctrine. It represents the central beliefs for waging war to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment, and tactics. It is the building material for strategy. It is fundamental to sound judgment. (3:1)

AirLand Battle doctrine provides the foundation for how the Army will train, organize and fight battles and campaigns. Adoption of AirLand Battle doctrine has caused a review of organizational structures, procedures, support doctrine and methodology, and equipment design to optimize the Army's ability to fight and win. For the AirLand Battle doctrinal approach to be successful, the doctrine must be widely known and understood by all. (4:6)

The Army's mission is to deter war, but if war comes, to fight. This implies concluding a conflict on terms favorable to US interests. Future military land campaigns will be conducted over greater distances, for longer durations and with greater intensity than any past operations. (4:1) It will take the combined effort of

both air and ground forces with a unity of purpose to ensure victory. It is vital for success on the future battlefield that all combat power and logistical support be optimally employed and effectively coordinated. AirLand Battle doctrine, if used effectively, can allow a smaller, agile, well-synchronized force to defeat a larger opposing force. (4:16)

AirLand Battle doctrine stresses the importance of throwing the enemy off balance with powerful thrusts from unexpected directions, then following up rapidly to prevent the enemy from recovering and to exploit success. (4:14) A deep attack against an enemy command and control facility to cripple the enemy's capability to coordinate and control his forces followed by an attack in the main battle area exemplifies this concept.

Army operational planning must concentrate on key objectives. Flexibility is vital. Creating opportunities to fight on favorable terms, by finding and exploiting enemy weaknesses, is key to success. Tactical planning must be precise enough to ensure synchronization throughout the battle, while being flexible enough to exploit enemy weaknesses and friendly successes. (4:14-15)

"Success on the battlefield will depend on the Army's ability to fight in accordance with four basic

tenets: initiative, agility, depth and synchronization." (4:15) A proposed new tenet, endurance, may be added in future AirLand Battle doctrine to recognize the importance of logistics to success on the battlefield. (5:3-10)

"Initiative means setting or changing the terms of battle by action." (4:15) Simply stated, whether attacking or defending, pressure placed on the enemy to prevent him from exploiting success, reinforcing, maneuvering, or otherwise seizing or maintaining the initiative will favorably affect the outcome of a battle. This means that all subordinate commanders must understand the senior commander's intent and be able to exercise initiative, that is, take reasonable risk and act independently in the absence of command and control. (4:15)

Initiative is also important logistically. "...Prepositioning supplies, establishment of sustainment priorities and innovative methods of delivering barrier materials...," are examples of logistics initiative. (6:27) A specific example of logistics initiative in support of tactical operations, is the Red Ball Express resupply operation in World War II. (6:27)

"Agility-the ability of friendly forces to act faster than the enemy-is the first prerequisite for seizing and holding the initiative." (4:16) Agility is the

ability to place superior friendly forces against enemy weaknesses. Agility requires sound intelligence, detailed planning, flexibility and responsive, effective tactical units. "Mission type" orders, maneuver and exploitation of success are all examples of superior agility. (4:16)

"Writers of sustainment doctrine do not treat agility as a required characteristic of the sustainment system, but as a characteristic of the maneuver force to be supported." (6:25) Slow moving support vehicles, tons of supplies, and the inability of combat service support units to rapidly displace are examples of areas where emphasis on logistical agility is necessary if maneuver agility is to be sustained. (6:25)

"Depth is the extension of operations in space, time, and resources." (4:16) Depth provides the space for maneuver, the time to plan, arrange and execute operations and the foundation for momentum in the attack and elasticity in the defense. (4:16) Depth implies fighting the rear battle, the main battle and the deep battle, that is, fighting throughout the entire battle field.

Combat service support doctrinal discussions of depth are "...limited to the participation of CSS units in rear battle and the difficulties in supporting the deep

battle..." (6:26) "CSS doctrine must begin to address how units are deployed and employed to provide depth to sustainment operations and to the force." (6:27)

"Synchronization is the arrangement of battlefield activities in time, space and purpose to produce maximum relative combat power at the decisive point. Synchronization is both a process and a result." (4:17) It is the ability to mass forces and fires at the critical point where enemy weakness or friendly successes can be optimally exploited, while using minimal force in other areas. (4:17-18)

Synchronization of logistical support implies, mass and economy of force; that is, getting logistical support where and when it will have the greatest impact on the success of the maneuver forces, while maintaining sustainment efforts elsewhere. There is little discussion in combat service support doctrine about how logistics synchronization can be achieved; that is, "...How to synchronize supply with transportation, maintenance with supply and so forth." (6:26)

Because of the importance of logistics to successful combat operations, the Army is considering adding endurance as a tenet to AirLand Battle doctrine. "'Endurance' is the ability of a force to sustain high levels of combat potential relative to its opponent over

the duration of an operational campaign -- its staying power." (5:3-10) The tenet of endurance puts combat service support operations on doctrinally equal footing with combat operations. Survivability, mobility, and employment of logistical elements are recognized as critical to combat success. Rapid reconstitution of combat ineffective units forcing the enemy to continuously face strong highly capable units is an example of endurance. (5:3-10 to 3-11)

This brings us to the discussion of deep operations. For our purposes, deep operations and deep battle are synonymous. Why are deep operations important to the success of the AirLand Battle concept? Deep operations afford the opportunity to engage and defeat a numerically superior force with minimum casualties. (7:3-4) Deep operations are directed against enemy forces not in contact, for the purpose of influencing the conduct of close operations. Examples of deep operations are attacks by fires, air or ground forces against enemy second echelon forces, command and control facilities and logistics centers. (4:19-20) Interdicting enemy supply lines, reserves, and communication centers was a tactic used in World War II, the Korean War, and the Vietnam War.

Today, the importance of deep operations is recognized in NATO where it is referred to as follow-on forces attack (FOFA). (7:1)

Logistical support to deep operations by ground forces involves the sustainment of those forces beyond the forward line of troops. In the next chapter we will discuss a general scenario for a deep operation, its logistics implications, and the capabilities of present combat service support units to sustain the operation. We will also discuss the three ways to support deep operations: include all combat service support with the maneuver force; resupply the maneuver force through a ground line of communication; and resupply the maneuver force through an air line of communication. (8:22)

CHAPTER III

CURRENT COMBAT SERVICE SUPPORT CAPABILITIES

Under existing policies for combat service support, the Division Support Command Commander is responsible to the Division Commander for orchestrating and executing the division logistical plan for battle. The Division Assistant Chief of Staff for Logistics, G-4, is the Division Commander's primary staff officer responsible for assisting the Division Support Command Commander in accomplishing this goal. Together, they allocate resources and take effective actions to ensure that logistical support is tailored to the support of the Division Commander's operational plan for the conduct of the battle. They advise the Division Commander on the feasibility of his plan from a logistical point of view and apprise him of the risk he may be accepting in executing his plan. (9:2-1 to 2-3)

In the Army of Excellence organizational structure, the Division Support Command consists of four battalions: three forward support battalions, one supporting each maneuver brigade; and a main support battalion supporting other divisional units and acting as backup to the forward

support battalions. Additional logistical support may be provided to the division by the Corps Support Command if required. (9:3-19 to 3-20)

Primarily the Division Support Command provides maintenance support and recovery, repair parts supply, food supplies, fuel, ammunition, transportation support and medical supply and support to divisional and other units in the division area. (9:3-17,4-2)

For our analysis, we will use a Western European battlefield scenario. We will use an armored division for a deep attack across the forward line of troops (FLOT). The objective will be attacked and seized by one of the division's armor heavy brigades. This brigade is presently the division reserve. The other two maneuver brigades are in contact with the enemy in the main battle area.

The penetrating brigade is composed of three M1A1 tank battalions, one mechanized infantry battalion with M2 fighting vehicles, supported by one self-propelled direct support artillery battalion with M109A2 howitzers with one attached multiple launch rocket system (MLRS) battery. Logistical support elements will accompany this brigade from the brigade's Forward Support Battalion and the Division Main Support Battalion.

The penetrating brigade's mission will be to pass through the other two brigades and penetrate through the FLOT to 50 kilometers behind enemy lines. The objective of the deep operation will be to seize, hold, and maintain intact a bridgehead and be prepared, on order, to attack into the rear of the first echelon of enemy forces or continue the attack into the enemy second echelon. (10:6) The shoulders of the salient will be secured by the two brigades on the FLOT. The Division Commander has deemed it necessary to retain this bridgehead for an anticipated corps counter attack and to preclude its use by enemy follow-on forces, "...enemy ground forces not yet engaged in the battle..." (11:vii) Expected duration of the deep operation will be five days. The brigade will conduct the deep operation with only the support of organic division logistics assets because the entire corps is in heavy contact.

The enemy is reaching a culminating point in his attack. Enemy second echelon follow-on forces are advancing toward the FLOT to reinforce weakening first echelon forces. Seizing the bridgehead will delay critical enemy reinforcement and will allow the corps to seize the initiative. The enemy is expected to vigorously attack the penetrating brigade with armor heavy second echelon forces.

Let us examine the lift capabilities of the logistical support element attached to the armor heavy brigade used in the deep operation. For the duration of the operation, the Forward Support Battalion, utilizing a one third slice of organic division transportation assets, has the capability to lift a maximum of 330 short tons of ammunition or general cargo daily with 9 allocated 5 ton trucks and 8 allocated 15 ton off-road capable tractor-trailers. The maximum fuel hauling capability of the attached combat service support element is 110,000 gallons daily with 11 allocated 5000 gallon tankers. All lift capabilities are based on vehicles operating for twenty hours a day, with two drivers per vehicle, with each vehicle making two trips each day and with no attrition. (12:1-154 to 1-255; 13:3-5 to 3-8)

Considering the distance travelled in our scenario and idling time for armored vehicles, the total fuel resupply requirement for the armor heavy brigade for this five day deep operation would be approximately 449,000 gallons. In calculating this fuel resupply requirement, we assumed that all vehicles were topped off before the penetration. (13:2-99 to 2-102)

With a deliberate organized attack, for the five day period, the brigade would consume approximately 3608 short tons of artillery, tank, MLRS and small arms

ammunition. Subtracting basic loads, the total lift requirement is approximately 2263 short tons for the five day period. (13:2-129)

Realistically, the brigade combat service support transport element cannot be expected to shuttle 50 to 75 kilometers twice daily through enemy lines to the division support area and ammunition control points with thin skinned fuel and resupply vehicles without some attrition. With no attrition and no augmentation, total lift capability would be 1650 short tons of ammunition and 550,000 gallons of fuel for the duration of the operation, slightly more than a 600 short ton shortfall. This shortfall does not include lift requirements for mines, water, subsistence, barrier materials, repair parts, medical supplies, or other necessary replenishment.

The shortfall in ammunition lift could be made up by utilizing surplus lift capability from the 40 organic 10 ton HEMMT vehicles of the supporting self-propelled direct support artillery battalion. (12:1-173) This work around, although unusual, makes this deep operation scenario feasible.

Given the size of the lift requirement to sustain the five day deep operation it is not desirable to have all required fuel, ammunition, repair parts, and other cargo accompany the maneuver force. The number of thin skinned,

slow moving combat service support vehicles required for a one time lift of sustainment would seriously hinder the maneuverability of the attacking force.

Resupply to the brigade through a ground line of communication as depicted in our scenario is the most feasible option. This option allows the most flexibility to the maneuver force but relies on an external combat force to hold the shoulders of the penetration and protect the ground line of communication.

Another means of resupply is by air. Without a secure airfield, in a high intensity combat situation, considering the enemy air defense capability, we feel that it would not be realistic to expect airlift to carry the entire resupply burden. Not only are the tonnages large, but, in our view, it is unlikely that keeping an air corridor to the brigade open for resupply would be practical given the vulnerability of tactical airlift assets and the relatively small size of the operation.

If we do some sensitivity analysis on our scenario by increasing the depth or duration of the penetration, we find that sustaining the operation can become infeasible. Increasing the depth reduces the number of ammunition and fuel lifts per day to one while simultaneously increasing the lift requirements. An increased duration has a similar effect by increasing consumption of ammunition and fuel,

while not increasing lift capability. Replenishment of supplies other than fuel and ammunition becomes more critical; thus, rendering sustainment infeasible.

We did not consider attrition in our analysis. Attrition would reduce lift requirements by the loss of combat systems while simultaneously reducing lift capabilities through the loss of sustainment systems.

The scenario posed here, although limited in depth and duration, may be a realistic one. We deliberately limited the scope of the penetration to show the feasibility of limited deep operations with present combat service support capabilities. Our analysis is contrary to the many writings that depict deep ground operations of any kind as infeasible.

Considering the importance of deep operations to the success of AirLand Battle, methods must be found to enhance sustainment of deep operations. The paucity of combat service support resources in a division as compared to the requirements to sustain a brigade in the deep attack, the vulnerability of those resources and the combat capabilities of our likely adversary mandate that the Army make a careful, realistic appraisal of future requirements for combat service support to AirLand Battle.

In the next chapter, we will discuss some of the initiatives that combat service support leadership has taken to bring logistical capability in line with the requirements of twenty-first century combat.

CHAPTER IV

FUTURE COMBAT SERVICE SUPPORT INITIATIVES

Can technological change, willingness to override traditional methods and organizational changes improve sustainability of AirLand Battle; thus, making deep operations supportable for longer durations and to greater distances?

AirLand Battle has an operational imperative to conduct deep operations against enemy second echelon and operational reserves to destroy the tempo of the enemy's force and to break up its combined arms cohesion. Deep operations may be conducted by integrated and simultaneous ground maneuver, fires and exploitive attacks against high value targets in the enemy's second echelon. (14:2) Success of the deep operation will depend on the ability to provide a logistical support structure to sustain the deep operation, while sustaining front and rear battles. Current combat service support structure, equipment and manning appear to be sufficient to logistically support deep operations of limited duration and distance, while simultaneously sustaining front and rear battles.

Should the division combat service support structure be changed? An evaluation of the evolution of

the Army of Excellence organization into the 21st century indicates little future organizational change to maneuver or combat service support units. The division will retain its integrity as a formation with its organic combat service support elements. There is, however, another school of thought evolving within the Army which would change the heavy corps structure to the point where divisions would provide only command and control and would not have a permanent task organization. The Division Support Command would disappear and its combat service support elements would be assigned to the brigades of the division. Combined arms organizations would be created within the brigade structures. (14:4)

In either structural option, there will be a requirement for combat service support methods and technology to become more capable of maneuver, survivability and sustainment than before. Changing the corps structure would require a rethinking of combat support and combat service support doctrine, training and methodology, as well as a restructuring of combat service support organizations. (14:5)

We can envision the Army of the 21st century composed of extremely lethal brigade combined arms teams with organic artillery, multiple launch rocket systems, combat support and combat service support elements. These

brigade combined arms teams will be capable of fighting throughout the battle area, as well as performing deep operations as required.

There will be a sustainability problem to be doctrinally resolved because of the "skip" between corps combat service support and the brigade combined arms teams. Depth and definition of brigade support areas will have to be clarified and levels of support and support responsibilities reidentified. For deep operations, secure main supply routes and rail lines will be required to sustain the force. (14:6)

Will technology help enhance logistical capabilities? No doubt, improved technology will be required to improve sustainability of AirLand Battle including deep operations by reducing support requirements and by increasing support capability. To reduce ammunition lift requirements, for instance, munitions must be smaller and lighter, multipurpose and with high lethality over wide ranges. Weapon systems must be easily repairable and have multiple back-up subsystems, modular parts and electrical component protection. Alternate energy sources that reduce dependency on fossil fuels must be developed. Logistics vehicles must be designed with high mobility, capacity and survivability in mind.

Because of emphasis on fuel conservation, a new family of engines and transmissions for combat and support vehicles is being developed. This family of engines will provide more power, while consuming half the fuel of present systems. "An example is the adiabatic diesel engine...that uses 10 percent less fuel than conventional engines...," while decreasing total vehicle weight. (15:8)

To increase the flow of fuel (or water) into the corps area and decrease reliance on 5000 gallon tankers, an automated pipeline equipment system (APES), is under development that will lay 20 miles of fuel (or water) line per day. The APES is designed for air transport in a C-130. One APES can move the equivalent of 180 5000 gallon tanker loads of fuel daily. (15:8) As with any pipeline, the question of interdiction is raised and must be resolved to ensure uninterrupted flow of fuel (or water) into the division area.

Does future methodology need to change to meet requirements for deep battle? The evolution of the Army of Excellence organization or the adaptation of the more radical change to the corps structure that does away with the division support structure will drive changes in combat service support methodology. Forming brigade combined arms

organizations will certainly call for a total relook at how combat service support organizations should be structured, their mission and how they accomplish their mission.

The Army Logistics Center is developing a combat distribution concept of forward logistical support which will be designed to provide responsive and far reaching distribution systems, support forward, provide a single point of contact for supported units, and will simplify combat service support command and control structures. (16:1-2)

This new combat distribution concept takes advantage of a technology called the palletized loading system (PLS). Using PLS flatracks (standard size steel pallets that fit on a special truck chassis), on wheels or in caches, PLS will achieve battlefield dispersion, mobility, survivability and speed of response. The PLS concept is aimed at establishing forward delivery of supplies to maneuver unit combat elements. PLS will be tailored to the delivery of Class I (subsistence), Class III (bulk petroleum), Class IV (barrier material) and Class V (ammunition) combat supplies. With its speed, ease of operation, flexibility and mobility, PLS provides a durable and versatile system of supply far forward. (17:1)

Control of the PLS distribution system at brigade level will be the responsibility of the Forward Support

Battalion Commander. Above brigade level, in the case of the Army of Excellence organization, the Division Support Command Commander will control the distribution system. Changing the heavy corps structure would do away with the Division Support Command and the control of the distribution system above the brigade level would become the responsibility of the Division G-4. (16:2) In either case, supported units will have a single point of contact and the command and control of the distribution system will be simplified through the use of automated supply systems.

The combat distribution concept will require extensive changes to combat service support structure and methodology. A Supply and Transport Company would be added to the Forward Support Battalion to deliver (using PLS) preconfigured loads of combat supplies (less ammunition) to immediate replenishment groups that will be established by the Supply and Transport Company colocated with the battalion field trains. Supplies will be drawn from mobile caches in the divisional area. The mobile caches will contain approximately half of the required combat supplies for a day of combat for a battalion task force. These caches will be dispersed throughout the divisional area to increase their survivability. In the case of artillery ammunition, separate dedicated ammunition control points

will be established near the brigade rear boundary that will be resupplied by the Supply and Transport Company. (16:2-3)

Maintenance support methodology and technology will evolve as requirements and technology evolve. Maintenance teams will operate far forward to provide accurate diagnosis, reliable repair and rapid recovery. Repair parts stockage will be slimmer and more mobile, with emphasis on on-hand spares. Plug-in, plug-out crew repairs will become the norm. Common test sets will be used at all levels. (16:3) Built in prognostic test equipment is under development that will be able to anticipate failure of key weapon system components, thus permitting timely replacement or repair. (15:8) Battalion and company sized units will be equipped to recover inoperable weapon systems. (16:3)

Medical support will utilize improved medical technology, treatment procedures and medical support capabilities to provide streamlined modernized medical forces with standardized organizations and fewer types of medical units. Modularly designed medical units enable the medical resource manager to rapidly tailor, augment, reinforce or reconstitute medical support to the battlefield in critical areas. (16:4)

In summary, future sustainment of AirLand Battle including deep operations will be characterized by new more streamlined organizational combat service support structures; new technology and operational techniques; mobility and survivability of support elements; new automated systems for control of distribution; an innovative fuel and water resupply system; dispersed combat supply caches; and a prepackaged, palletized loading distribution system.

Considering our scenario, reducing fuel requirements through superior power-train technology and ammunition lift requirements through the development of lighter, multipurpose ammunition would reduce the resupply requirement. The APES, if not interdicted, would virtually eliminate the requirement for 5000 gallon tanker support. The improvements in maintainability and repairability would keep more weapons systems in operation. Improved medical support would return more soldiers to battle and reduce combat deaths. The combat distribution concept would make available far forward more required supplies faster, in more survivable, well disbursed caches.

Our scenario was a very conservative approach to deep operations based on present limited sustainability capabilities. With enhanced capabilities coupled with reduced requirements, it is conceivable that a deep

operation can be supported for longer durations and to greater depths. This will give greater flexibility of action to the combat commander, while increasing the probability of success on the battlefield.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

As stated earlier, AirLand Battle doctrine provides the foundation for how the Army will train, organize and fight battles and campaigns. (4:6)

A key to the success of AirLand Battle is the deep operation. "The concept of interdicting the enemy's supplies, follow-on forces, reserves, and communications to impede his ability to commit these at times and places of his choosing is a familiar feature of modern war." (4:19)

The deep operations concept of AirLand Battle was examined to determine if the deep operation is sustainable with present combat service support capabilities. Selected new sustainment initiatives were reviewed. The authors' research revealed that the Army presently has the capability to sustain a deep attack limited in duration and distance in the European battlefield environment.

"...AirLand Battle doctrine substantially changed the way the US Army fights, and AirLand Battle sustainment will be vastly different than anything encountered on previous battlefields." (6:24) "...Sustainment doctrine must be couched in AirLand Battle terminology, anchored to the tenets of AirLand Battle and inseparable from the other

elements of combat power." (6:29) Despite these facts, a sustainment doctrine for the support of AirLand Battle has not been finalized and disseminated to the field.

The lack of an over-arching sustainment doctrine endorsed by Army leadership and understood by combat service support personnel, may seriously disjoint efforts to improve the organization, training, equipping and support methodology of combat service support units to improve AirLand Battle sustainment.

The Army must give immediate attention to publishing a sustainment doctrine that can be used as a foundation for efforts to modernize, equip and train the combat service support force cohesively; thus, ensuring adequate sustainment on the battlefields of the twenty-first century.

Efforts to enhance combat service support capabilities by streamlining organizational structures, while developing new support techniques, must continue. These efforts must take maximum advantage of technology if sustainment capability is to keep pace with AirLand Battle requirements.

Use of improved power train technology to reduce fuel requirements coupled with the introduction of better fuel delivery systems and the adoption of a single fuel are positive steps toward more efficient fuel resupply.

However, a parallel effort must be made to reduce ammunition lift requirements by utilizing smaller, lighter, multipurpose munitions with high lethality over many ranges.

The combat distribution concept coupled with a new automated control system, when implemented, will significantly improve the responsiveness of the supply system, as well as providing supplies in survivable caches far forward in the combat area. The PLS, because it is key to the new concept, must be funded.

Serious efforts must be made to design and procure survivable, mobile combat service support vehicles. Present combat service support vehicles are soft skinned, heavy and lack the mobility of combat vehicles.

Efficiency of operation, survivability, and mobility of combat service support elements tied to an over-arching doctrine are key to sustainment of AirLand Battle. The Army should continue initiatives to redesign organizational structures and design new operational techniques to take advantage of new technology; improve support element mobility and survivability; and design new automated distribution systems to enhance support to AirLand Battle.

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GLOSSARY

APES	Automated Pipeline Equipment System
CLASS I	Subsistence supply category (18:2)
CLASS III	Petroleum, oil and lubricant supply category (18:2)
CLASS IV	Construction materials (including fortification and barrier materials) supply category (18:2)
CLASS V	Ammunition supply category (18:2)
CSS	Combat Service Support
FLOT	Forward Line of Troops
FOFA	Follow-On Force Attack
G-4	Assistant Chief of Staff, Logistics
MLRS	Multiple Launch Rocket System
NATO	North Atlantic Treaty Organization
PLS	Palletized Loading System
Trains	Grouping of personnel, vehicles and equipment to provide CSS (9:3-5)